

Ratio and Rates Quiz

Name: Solutions

Instructions:

- Write your answers in the space provided.
- You may use a calculator

Level 1-2

Simplify the following ratios:

1. 200mL : 50kL

$$= 200 \text{ mL} : 50 \times 1000 \times 1000 \text{ mL}$$

$$= 2 \text{ mL} : 50000 \text{ mL}$$

$$= 1 : 25000$$

2. 0.5 weeks : 600 seconds

$$= 0.5 \times 7 \times 24 \times 60 \times 60 \text{ s} : 600 \text{ s}$$

$$= 302400 \text{ s} : 600 \text{ s}$$

$$= 504 : 1$$

Level 3-4

Find the unknowns:

3. If $4a = 13b$, find $a:b$

$$4a = 13b$$

$$\frac{a}{b} = \frac{13}{4}$$

$$a:b = 13:4$$

4. Given $a:b = 5:8$ and $b:c = 3:2$, find $a:b:c$

$$\times 3 (a:b = 5:8)$$

$$a:b = 15:24$$

$$\times 8 (b:c = 3:2)$$

$$b:c = 24:16$$

$$a:b:c$$

$$5 \quad 8 \quad 2$$

$$15:24:16$$

$$\therefore a:b:c = 15:24:16$$

Simplify the following ratios

5. 0.4 : 2.6 : 13.7

$$= 4 : 26 : 137$$

6. $a/4 : 2a/5 : 7a/8$

$$= \left(\frac{a}{4} : \frac{2a}{5} : \frac{7a}{8} \right) \times \frac{40}{a}$$

$$= \frac{a}{4} \times \frac{40}{a} : \frac{2a}{5} \times \frac{40}{a} : \frac{7a}{8} \times \frac{40}{a}$$

$$= 10 : 16 : 35$$

Ratio and Rates Quiz

Level 5-6

Solve the following:

7. The regular price of a bicycle costs \$550 but is now on sale for \$467.50.

a) Find the discount.

$$\begin{aligned}\text{Discount} &= 550 - 467.5 \\ &= \$82.5\end{aligned}$$

b) Find the ratio of the discount to the marked price.

$$\begin{aligned}\text{Ratio of the discount to the marked price} \\ &= 82.5 : 550 \\ &= (82.5 : 550) \div 275 \\ &= 3 : 20\end{aligned}$$

8. Mr. Chau went from Causeway Bay to Ma On Shan by MTR. It costs \$17.0 for the fare and it takes 53 minutes to get there. How much does it cost to be on the MTR every second?

$$\begin{aligned}&\$17 \div 53 \text{ min} \\ &= \$17 \div 53 \times 60 \text{ s} \\ &= \frac{17}{53} \times 60 \\ &= \$0.053/\text{s} \text{ (corr. to 1.d.p.)} \\ &= 0.53 \text{¢/s} \text{ (corr. to 2.d.p.)}\end{aligned}$$

Level 7-8 (ASMA 2011-6 Question 3, edited)

9. A car travels 40 km/h for 20 km, 36 km/h for 24 km and 48 km/h for 16 km. What is the average (mean) speed in km/hour? (use $d = rt$)

$$\begin{aligned}&\text{the total distance} \\ &= 20 \text{ km} + 24 \text{ km} + 16 \text{ km} \\ &= 60 \text{ km}\end{aligned}$$

$$\begin{aligned}&\text{Time taken} \\ &= \frac{20}{40} \text{ h} + \frac{24}{36} \text{ h} + \frac{16}{48} \text{ h} \\ &= \frac{1}{2} \text{ h} + \frac{2}{3} \text{ h} + \frac{1}{3} \text{ h} \\ &= 1\frac{1}{2} \text{ h}\end{aligned}$$

$$\begin{aligned}\therefore \text{The average speed} &= \\ &= \frac{60 \text{ km}}{1.5 \text{ h}} = 40 \text{ km/h.}\end{aligned}$$

Ratio and Rates Quiz 2

Name: Solution

Instructions:

- Write your answers in the space provided.
- You may use a calculator

Level 1-2

Simplify the following ratios (ratio must be the same unit):

1. 20km : 20cm

$$= \frac{20 \times 1000 \times 100}{20} = 200000$$

2. 500 seconds : 500 days

$$= 500 = 500 \times 24 \times 60 \times 60$$

$$= 1 = 86400$$

$$\frac{24}{24} = 1$$

$$\frac{72000}{144} = 500$$

Level 3-4

It is given that a, b, c are non-zero. Find a, b, c.

3. $a/b = 3, c = 2b$

$$\frac{a}{b} = 3$$

$$c = 2b$$

$$\frac{c}{b} = 2$$

$$\therefore a:b:c = 3:1:2$$

$$\therefore a = 3$$

$$b = 1$$

$$c = 2$$

4. $3a = 6b = 5c$

① $3a = 6b$

$$\frac{a}{b} = \frac{6}{3} = 2$$

② $6b = 5c$

$$\frac{b}{c} = \frac{5}{6}$$

③ $a:b:c$

$$\frac{2}{1} \quad \frac{1}{5} \quad \frac{6}{6}$$

$$10:5:6$$

④ $a = 10$

$$b = 5$$

$$c = 6$$

5. Mr. Chau won the lottery and won \$30 million. Mr. Chau wants to save some money. The ratio he wants to save his money is 7:3 (savings : spending). Find the amount Mr. Chau wants to save.

$$\$30 \text{ million} \times \frac{7}{7+3}$$

$$= \$30 \text{ million} \times \frac{7}{10}$$

$$= \$21 \text{ million}$$

Mr Chau wants to save \$21 million

Ratio and Rates Quiz 2

Level 5-6

6. The population of Hong Kong is about 7.16 million people. In 2013, South China Morning Post has found that 1.31 million people are officially poor.

a) What is the ratio of poor people to non-poor people?

$$\begin{aligned} \text{poor people} &: \text{non-poor people} \\ &= 1.31 \text{ million} : (7.16 - 1.31) \text{ million} \\ &= 1.31 : 5.85 = 131 : 585 \end{aligned}$$

b) In 2020, the population will be projected to be 7.61 million people. If the ratio of poor people remains the same, how many poor people will be in Hong Kong in 2020?

$$\begin{aligned} &7.61 \times \frac{131}{131+585} \\ &= 7.61 \times \frac{131}{716} \\ &= 1.39 \text{ million (con to 3 d.p.)} \end{aligned}$$

7. If \$55 Hong Kong dollars can be exchanged for \$7.10 US dollars, how much ~~can~~ US dollars can you get if you exchanged 1000 Hong Kong dollars? (to the nearest cent)

<p>The rate of US \$ per HK\$</p> $\begin{aligned} &\text{US\$ } 7.1 / \text{HK\$ } 55 \\ &= 0.1291 \text{ HK\$} / \text{HK\$} \\ &= 12.91¢ / \text{HK\$} \end{aligned}$	<p>The US dollars can be exchanged:</p> $\begin{aligned} &= 1000 \times 12.91¢ \\ &= 129.10¢ \quad (\text{to the nearest cent}) \end{aligned}$
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Level 7-8

8. A particular bike wheel makes 1056 revolutions in one mile. What is the approximate radius of the wheel in feet?

$$\begin{aligned} p &= 2\pi r \\ \frac{1760 \times 3}{1056} &= 2 \times 3.14 \times r \\ r &= 0.8 \text{ ft} \end{aligned}$$

\therefore The approximate radius is 0.8 ft